Final Public Report for ESA-026

Introduction: This assessment was conducted at the Fayetteville, AR plant of Superior Industries International, Inc. This plant produces cast aluminum alloy wheels for major auto manufacturers.

Melting: Raw materials are charged into melting furnaces. The metal is then tapped into transfer ladles and then transported to holding pots on casting machines.

Heat Treating: After the wheels are cast, they are solution heat treated and quenched. Some product lines will subsequently receive a low temperature oven aging treatment.

Finishing: Finishing practices vary with the product Natural gas burners are used at several stages in these processes, primarily for drying. Elsewhere, steam is the primary source of heat.

Objective of ESA: To identify opportunities for energy savings on the melting and heat treating furnaces.

Focus of Assessment: Two melting furnaces, typical of the two basic types on site, and one of the heat treating furnaces.

Approach for ESA: Combine field test data with corporate energy use and production records on two representative melting furnaces and one heat treating furnace.

Identify any equipment/operating conditions, which, if corrected, can enhance energy efficiency.

Identify opportunities to reduce energy consumption through equipment or process modification.

Train plant's Energy Management Engineer to use PHAST to analyze the remaining furnaces in this and other company plants.

Near Term Opportunities:

The bottom edge of the door on #2 furnace is deteriorating due to mechanical damage during furnace charging. At high fire combustion gases blow through this opening, aggravating the damage to the door. When the burner system cycles to low, stack draft draws in cold air. Rectifying the leakage will require rebuilding the bottom of the door and patching the hearth refractories opposite the door seal. Materials and labor for this work are roughly estimated at $2500, because some of the door steelwork will need to be repaired.

At reduced firing rates, excess oxygen in this furnace studied is higher than optimum. A good part of this excess is probably due to air leakage under the damaged door; burner control misadjustment may also be a contributing factor.

Eliminating the air leak has the potential to save 0.3% of the plant's annual gas consumption.

Tuning the burners will eliminate the remainder of the excess oxygen. We recommend tuning the burners on a monthly schedule. If these are performed by in-house staff, a flue gas analyzer (cost between $2000 and $3500) will be required, along with an estimated $100 labor & burden per tuneup. Service parts for the analyzer will probably add another $500 per year.

Medium Term Opportunities:

1. #5 Melting furnace uses T bars and sows as a large percentage of its charge. These are now charged at ambient temperature. Preheating this material with flue gases from the furnace would yield substantial savings. Preheating the T bars and sows to 500F will reduce annual gas consumption 1.45%.

The present plant layout would appear to favor installation of a preheating chamber or cabinet against the outer wall of the building. Flue gases could be ducted between the melters and preheater, and an exhaust fan could be used to draw the gases through the preheaters.

2. An additional savings opportunity lies in preheating rejected wheels returned for remelting. They could easily be preheated nearly to the point of melting by rolling them into the furnace through an inclined chute with flue gases passing counterflow to the incoming wheels. Preheating these wheels to 1000F will produce an annual gas savings of 0.6%.

Long Term Opportunities:

The melting furnaces appear to be good candidates for conversion to regenerative burner systems. The exhaust gases are high temperature and fairly clean. If the present ambient air burner system on #5 furnace were replaced with regenerative burners developing 1300F combustion air preheat, annual savings would be 5.5% of annual gas consumption.

If the regenerative system works well on #5 furnace, at least one other melting furnace could be converted the same way.

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